



## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2022-0978; Project Identifier AD-2022-00460-E]**

**RIN 2120-AA64**

#### **Airworthiness Directives; General Electric Company Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** The FAA proposes to adopt a new airworthiness directive (AD) for certain General Electric Company (GE) GEnx-1B and GEnx-2B model turbofan engines. This proposed AD was prompted by a manufacturer investigation that revealed that certain high-pressure turbine (HPT) stage 2 disks, forward seals, and stages 6-10 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. This proposed AD would require the replacement of the affected HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools. The FAA is proposing this AD to address the unsafe condition on these products.

**DATES:** The FAA must receive comments on this proposed AD by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to <https://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: (202) 493-2251.
- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- Hand Delivery: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For service information identified in this NPRM, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com); website: <https://www.ge.com>. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2022-0978; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this NPRM, any comments received, and other information. The street address for Docket Operations is listed above.

**FOR FURTHER INFORMATION CONTACT:** Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: [Alexei.T.Marqueen@faa.gov](mailto:Alexei.T.Marqueen@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Comments Invited**

The FAA invites you to send any written relevant data, views, or arguments about this proposal. Send your comments to an address listed under ADDRESSES. Include “Docket No. FAA-2022-0978; Project Identifier AD-2022-00460-E” at the beginning of your comments. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this proposal because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to <https://www.regulations.gov>, including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this NPRM.

## **Confidential Business Information**

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing CBI should be sent to Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803. Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

## **Background**

The FAA was notified by the manufacturer of the detection of iron inclusion in an HPT stage 2 disk manufactured from the same powder metal material used to manufacture certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools for GEnx-1B64, GEnx-1B64/P1, GEnx-1B64/P2, GEnx-1B67, GEnx-1B67/P1, GEnx-1B67/P2, GEnx-1B70, GEnx-1B70/75/P1, GEnx-1B70/75/P2, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B70C/P1, GEnx-1B70C/P2, GEnx-1B74/75/P1, GEnx-1B74/75/P2, GEnx-1B76/P2, GEnx-1B76A/P2 (GEnx-1B) and GEnx-2B67, GEnx-2B67B, and GEnx-2B67/P (GEnx-2B) model turbofan engines. Further investigation by the manufacturer determined that the iron inclusion is attributed to deficiencies in the manufacturing process. The investigation by the manufacturer also determined that certain GEnx-1B and GEnx-2B HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools made from billets manufactured using the same process may have reduced material properties and a lower fatigue life capability due to iron inclusion, which may cause premature fracture and uncontained failure. As a result of its investigation, the manufacturer published service information that specifies procedures for the removal and replacement of certain HPT stage 2 disks, forward seals, and

stages 6-10 compressor rotor spools installed on GEnx-1B and GEnx-2B model turbofan engines. This condition, if not addressed, could result in uncontained debris release, damage to the engine, and damage to the aircraft.

### **FAA’s Determination**

The FAA is issuing this NPRM after determining that the unsafe condition described previously is likely to exist or develop on other products of the same type design.

### **Related Service Information**

The FAA reviewed GE GEnx-1B Service Bulletin 72-0505, Revision 02, dated April 5, 2022. The FAA also reviewed GE GEnx-2B Service Bulletin 72-0444, Revision 02, dated April 5, 2022. This service information describes procedures for removing the HPT stage 2 disk, forward seal, and stages 6-10 compressor rotor spool. These documents are distinct since they apply to different engine models.

### **Proposed AD Requirements in this NPRM**

This proposed AD would require the removal of certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools and replacement with parts eligible for installation.

### **Differences Between this Proposed AD and the Service Information**

GE GEnx-1B Service Bulletin 72-0505, Revision 02, dated April 5, 2022, uses the term “HPT rotor stage 2 disk,” while this proposed AD uses the term “HPT stage 2 disk.”

### **Costs of Compliance**

The FAA estimates that this AD, if adopted as proposed, would affect 3 engines installed on airplanes of U.S. registry. The FAA estimates that 0 engines installed on airplanes of U.S. registry would require replacement of the forward seal or HPT stage 2 disk.

The FAA estimates the following costs to comply with this proposed AD:

#### **Estimated costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
Replace stages 6-10	8 work-hours x \$85 per hour =	\$846,519 (average pro-	\$847,199	\$2,541,597

compressor rotor spool	\$680	rated part cost)		
Replace forward seal	8 work-hours x \$85 per hour = \$680	\$364,558 (average pro-rated part cost)	\$365,238	\$0
Replace HPT stage 2 disk	8 work-hours x \$85 per hour = \$680	\$363,424 (average pro-rated part cost)	\$364,104	\$0

### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA’s authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency’s authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

### **Regulatory Findings**

The FAA determined that this proposed AD would not have federalism implications under Executive Order 13132. This proposed AD would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify this proposed regulation:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Would not affect intrastate aviation in Alaska, and
- (3) Would not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

### **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

## **The Proposed Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA proposes to amend 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

**General Electric Company:** Docket No. FAA-2022-0978; Project Identifier AD-2022-00460-E.

#### **(a) Comments Due Date**

The FAA must receive comments on this airworthiness directive (AD) by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

None.

#### **(c) Applicability**

This AD applies to General Electric Company GEnx-1B64, GEnx-1B64/P1, GEnx-1B64/P2, GEnx-1B67, GEnx-1B67/P1, GEnx-1B67/P2, GEnx-1B70, GEnx-1B70/75/P1, GEnx-1B70/75/P2, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B70C/P1, GEnx-1B70C/P2, GEnx-1B74/75/P1, GEnx-1B74/75/P2, GEnx-1B76/P2, GEnx-1B76A/P2, GEnx-2B67, GEnx-2B67B, and GEnx-2B67/P model turbofan engines with an installed high-pressure turbine (HPT) stage 2 disk, forward seal, or stages 6-10 compressor rotor spool with a part number (P/N) and serial number (S/N) identified in Table 1 to paragraph (c) of this AD.

**Table 1 to Paragraph (c) – Affected HPT Stage 2 Disks, Forward Seals, and Stages 6-10 Compressor Rotor Spools**

<b>Part Name</b>	<b>P/N</b>	<b>S/N</b>
HPT stage 2 disk	2300M84P02	TMT4AF08 TMT4AF10

Part Name	P/N	S/N
		TMT4AF11
		TMT4AF12
Forward seal	2417M60P02	VOLF1931
		VOLF1933
		VOLF1942
		VOLF1977
		VOLF1993
		VOLF2014
Stages 6-10 compressor rotor spool	2340M36G01	GWN0R86N
Stages 6-10 compressor rotor spool	2439M35G01	GWN0RCKT
		GWN0R62G
		GWN0R86J
Stages 6-10 compressor rotor spool	2439M35G02	GWN0RA89
		GWN0R6K9
		GWN0R7G9
		GWN0R7K4
		GWN0R752
		GWN0R98P
Stages 6-10 compressor rotor spool	2610M90G01	GWN0R5EK
		GWN0R6EH
		GWN0R7K1
		GWN0R89A

**(d) Subject**

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine  
Compressor Section; 7250, Turbine Section.

**(e) Unsafe Condition**

This AD was prompted by a manufacturer investigation that revealed certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. The FAA is issuing this AD to prevent fracture and potential uncontained failure of certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools. The unsafe condition, if not addressed, could result in uncontained debris release, damage to the engine, and damage to the aircraft.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Required Actions**

(1) Before exceeding 600 flight cycles after the effective date of this AD, remove the affected HPT stage 2 disk, forward seal, and stages 6-10 compressor rotor spool from service and replace with a part eligible for installation.

(2) For affected engines not in service, before further flight, remove the affected HPT stage 2 disk, forward seal, and stages 6-10 compressor rotor spool and replace with a part eligible for installation.

**(h) Definitions**

(1) For the purpose of this AD, a “part eligible for installation” is any HPT stage 2 disk, forward seal, or stages 6-10 compressor rotor spool with a P/N and S/N not identified in Table 1 to paragraph (c) of this AD.

(2) For the purpose of this AD, “engines not in service” are engines that are in long-term or short-term storage as of the effective date of this AD.

**(i) Installation Prohibition**

After the effective date of this AD, do not install an HPT stage 2 disk, forward seal, or stages 6-10 compressor rotor spool with a P/N and S/N identified in Table 1 to paragraph (c) of this AD onto any engine.

**(j) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (k) of this AD and email to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.



**(k) Related Information**

For more information about this AD, contact Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: [Alexei.T.Marqueen@faa.gov](mailto:Alexei.T.Marqueen@faa.gov).

Issued on July 21, 2022.

Christina Underwood, Acting Director,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

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